

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
CHAPTER 10 STEAM AND POWER CONVERSION.....		10.1-1
10.1 Summary Description.....		10.1-1
10.1.1 General Description		10.1-1
10.1.2 Protective Features.....		10.1-2
10.1.3 Combined License Information on Erosion-Corrosion Monitoring		10.1-3
10.2 Turbine-Generator.....		10.2-1
10.2.1 Design Basis		10.2-1
10.2.1.1 Safety Design Basis.....		10.2-1
10.2.1.2 Power Generation Design Basis		10.2-1
10.2.2 System Description		10.2-1
10.2.2.1 Turbine-Generator Description.....		10.2-2
10.2.2.2 Turbine-Generator Cycle Description		10.2-2
10.2.2.3 Excitation Description		10.2-3
10.2.2.4 Digital Electrohydraulic System Description.....		10.2-3
10.2.2.5 Turbine Protective Trips.....		10.2-7
10.2.2.6 Other Protective Systems.....		10.2-10
10.2.2.7 Plant Loading and Load Following		10.2-10
10.2.2.8 Inspection and Testing Requirements.....		10.2-10
10.2.3 Turbine Rotor Integrity		10.2-11
10.2.3.1 Materials Selection		10.2-11
10.2.3.2 Fracture Toughness		10.2-11
10.2.3.3 High Temperature Properties		10.2-13
10.2.3.4 Turbine Rotor Design		10.2-13
10.2.3.5 Preservice Tests and Inspections		10.2-14
10.2.3.6 Maintenance and Inspection Program Plan		10.2-14
10.2.4 Evaluation		10.2-16
10.2.5 Instrumentation Applications		10.2-16
10.2.6 Combined License Information on Turbine Maintenance and Inspection.....		10.2-18
10.2.7 References.....		10.2-18
10.3 Main Steam Supply System.....		10.3-1
10.3.1 Design Basis		10.3-1
10.3.1.1 Safety Design Basis.....		10.3-1
10.3.1.2 Power Generation Design Basis		10.3-3
10.3.2 System Description		10.3-4
10.3.2.1 General Description.....		10.3-4
10.3.2.2 Component Description.....		10.3-4
10.3.2.3 System Operation		10.3-9
10.3.3 Safety Evaluation		10.3-10
10.3.4 Inspection and Testing Requirements		10.3-11
10.3.4.1 Preoperational Testing.....		10.3-11
10.3.4.2 In-service Testing		10.3-12

TABLE OF CONTENTS (Cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
10.3.5	Water Chemistry	10.3-12
10.3.5.1	Chemistry Control Basis.....	10.3-13
10.3.5.2	Contaminant Ingress.....	10.3-13
10.3.5.3	Condensate Polishing	10.3-14
10.3.5.4	Chemical Addition	10.3-14
10.3.5.5	Action Levels for Abnormal Conditions	10.3-14
10.3.5.6	Layup and Heatup	10.3-14
10.3.5.7	Chemical Analysis Basis	10.3-15
10.3.5.8	Sampling	10.3-15
10.3.5.9	Condenser Inspection	10.3-15
10.3.5.10	Conformance to Branch Technical Position MTEB 5-3	10.3-15
10.3.6	Steam and Feedwater System Materials.....	10.3-16
10.3.6.1	Fracture Toughness	10.3-16
10.3.6.2	Material Selection and Fabrication.....	10.3-16
10.3.7	Combined License Information.....	10.3-16
10.3.8	References.....	10.3-16
10.4	Other Features of Steam and Power Conversion System	10.4-1
10.4.1	Main Condensers	10.4-1
10.4.1.1	Design Basis.....	10.4-1
10.4.1.2	System Description.....	10.4-1
10.4.1.3	Safety Evaluation	10.4-3
10.4.1.4	Tests and Inspections.....	10.4-3
10.4.1.5	Instrumentation Applications	10.4-3
10.4.2	Main Condenser Evacuation System.....	10.4-3
10.4.2.1	Design Basis.....	10.4-4
10.4.2.2	System Description.....	10.4-4
10.4.2.3	Safety Evaluation	10.4-5
10.4.2.4	Tests and Inspections.....	10.4-5
10.4.2.5	Instrumentation Applications	10.4-5
10.4.3	Gland Seal System	10.4-6
10.4.3.1	Design Basis.....	10.4-6
10.4.3.2	System Description.....	10.4-6
10.4.3.3	Safety Evaluation	10.4-7
10.4.3.4	Tests and Inspections.....	10.4-8
10.4.3.5	Instrumentation Applications	10.4-8
10.4.4	Turbine Bypass System.....	10.4-8
10.4.4.1	Design Basis.....	10.4-8
10.4.4.2	System Description.....	10.4-9
10.4.4.3	System Operation	10.4-10
10.4.4.4	Safety Evaluation	10.4-11
10.4.4.5	Inspection and Testing Requirements.....	10.4-11
10.4.4.6	Instrumentation Applications	10.4-11

TABLE OF CONTENTS (Cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
10.4.5	Circulating Water System	10.4-11
10.4.5.1	Design Basis.....	10.4-11
10.4.5.2	System Description.....	10.4-12
10.4.5.3	Safety Evaluation	10.4-15
10.4.5.4	Tests and Inspections.....	10.4-15
10.4.5.5	Instrumentation Applications	10.4-15
10.4.6	Condensate Polishing System	10.4-16
10.4.6.1	Design Basis.....	10.4-16
10.4.6.2	System Description.....	10.4-17
10.4.6.3	System Operation	10.4-17
10.4.6.4	Safety Evaluations	10.4-18
10.4.6.5	Tests and Inspections.....	10.4-18
10.4.6.6	Instrument Applications	10.4-18
10.4.7	Condensate and Feedwater System.....	10.4-18
10.4.7.1	Design Basis.....	10.4-19
10.4.7.2	System Description.....	10.4-21
10.4.7.3	Safety Evaluation	10.4-30
10.4.7.4	Tests and Inspections.....	10.4-31
10.4.7.5	Instrumentation Applications	10.4-32
10.4.8	Steam Generator Blowdown System.....	10.4-33
10.4.8.1	Design Basis.....	10.4-33
10.4.8.2	System Description.....	10.4-34
10.4.8.3	Safety Evaluation	10.4-39
10.4.8.4	Inspection and Testing Requirements.....	10.4-40
10.4.9	Startup Feedwater System.....	10.4-41
10.4.9.1	Design Basis.....	10.4-41
10.4.9.2	System Description.....	10.4-43
10.4.9.3	Safety Evaluation	10.4-47
10.4.9.4	Tests and Inspections.....	10.4-48
10.4.9.5	Instrumentation Applications	10.4-49
10.4.10	Auxiliary Steam System.....	10.4-49
10.4.10.1	Design Basis.....	10.4-49
10.4.10.2	System Description.....	10.4-50
10.4.10.3	Safety Evaluation	10.4-51
10.4.10.4	Tests and Inspections.....	10.4-51
10.4.10.5	Instrumentation Applications	10.4-51
10.4.11	Turbine Island Chemical Feed	10.4-52
10.4.11.1	Design Basis.....	10.4-52
10.4.11.2	System Description.....	10.4-52
10.4.11.3	Safety Evaluation	10.4-54
10.4.11.4	Tests and Inspections.....	10.4-54
10.4.11.5	Instrumentation Applications	10.4-54

TABLE OF CONTENTS (Cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
10.4.12	Combined License Information.....	10.4-54
10.4.12.1	Circulating Water System.....	10.4-54
10.4.12.2	Condensate, Feedwater and Auxiliary Steam System Chemistry Control	10.4-54
10.4.12.3	Potable Water	10.4-55
10.4.13	References.....	10.4-55

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
10.1-1	Significant Design Features and Performance Characteristics for Major Steam and Power Conversion System Components	10.1-4
10.2-1	Turbine-Generator and Auxiliaries Design Parameters	10.2-19
10.2-2	Turbine Overspeed Protection	10.2-20
10.2-3	Generator Protective Devices Furnished with the Voltage Regulator Package (Sheets 1 – 2)	10.2-21
10.2-4	Turbine-Generator Valve Closure Times	10.2-23
10.3.2-1	Main Steam Supply System Design Data	10.3-17
10.3.2-2	Design Data for Main Steam Safety Valves	10.3-18
10.3.2-3	Description of Main Steam and Main Feedwater Piping	10.3-19
10.3.2-4	Main Steam Branch Piping (2.5-inch and Larger) Downstream of MSIV	10.3-20
10.3.3-1	Main Steam Supply System Failure Modes and Effects Analysis (Sheets 1 – 10)	10.3-21
10.3.5-1	Guidelines for Secondary Side Water Chemistry During Power Operation (Sheets 1 – 3)	10.3-31
10.3.5-2	Guidelines for Steam Generator Water During Cold Shutdown/Wet Layup	10.3-34
10.3.5-3	Guidelines for Steam Generator Blowdown During Heatup (> 200°F to < 5% Power)	10.3-35
10.4.1-1	Main Condenser Design Data	10.4-56
10.4.5-1	Design Parameters for Major Circulating Water System Components	10.4-57
10.4.7-1	Condensate and Feedwater System Component Failure Analysis (Sheets 1 – 2)	10.4-58
10.4.9-1	Startup Feedwater System Component Failure Analysis (Sheets 1 – 2)	10.4-60
10.4.9-2	Nominal Component Design Data – Startup Feedwater System	10.4-62

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
10.1-1	Rated Heat Balance	10.1-5
10.2-1	Turbine Generator Outline Drawing (Sheets 1 – 2)	10.2-25
10.2-2	Emergency Trip System Functional Diagram.....	10.2-29
10.3.2-1	Main Steam Piping and Instrumentation Diagram (Safety Related System) (Sheets 1 – 2)	10.3-37
10.3.2-2	Main Steam System Diagram.....	10.3-41
10.4.3-1	Gland Seal System Piping and Instrumental Diagram.....	10.4-63
10.4.6-1	Condensate Polishing System Piping and Instrumentation Diagram (Typical)	10.4-65
10.4.7-1	Condensate and Feedwater System Piping and Instrumentation Diagram (Sheets 1 – 4)	10.4-67
10.4.8-1	Steam Generator Blowdown System Piping and Instrumentation Diagram	10.4-75